



**THE UNITED STATES PATENT AND TRADEMARK OFFICE**

**Applicants:** DUBROVSKY Roman and BEZMELNITSYN Valeriy.

**Serial No.:** 10/796,458

**Filed:** March 09, 2004

**Title:** Method and apparatus for carbon allotropes synthesis

**Art Unit:** 1754

**Examiner:** Alvin T. Raetzsh

**AMENDMENT AND RESPONSE**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

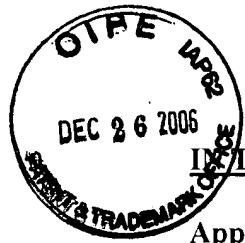
SIR:

The enclosed is a copy of the amendment, specification, claims and applicant Arguments/Remarks made in an amendment submitted on March 9, 2006. The applicant, Roman Dubrovsky passed on in August 16 of 2006. The second applicant, Valeriy Bezmelnitsyn wished to inform the examiner of this manner and the examiner is invited to telephone Valery Bezmelnitsyn with any questions, comments, objections, or recommendations they may have.

Sincerely,

Valeriy Bezmelnitsyn

12/21/2006



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicants: DUBROVSKY Roman and BEZMELNITSYN Valeriy.

Serial No. : 10/796,458

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**AMENDMENT AND RESPONSE**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

**PETITION TO CLAIM BENEFIT UNDER 35 U.S.C 119(e) OF PRIOR FILED  
PROVISIONAL APPLICATION (37 C.F.R. 1.78(a)(6))**

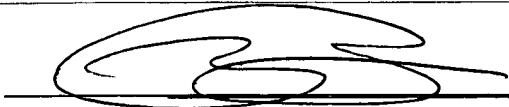
Mail Stop AF  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

SIR:

1. Applicants hereby petition, in accordance with 37 C.F.R. 1.78(a)(6), to claim the benefit for this application under 35 U.S.C. 119(e), of prior provisional application:  
Provisional Application No. 60/453,805 filed March 11, 2003.
2. Submitted herewith is a copy of an Amendment filed December 20, 2006 which makes the reference to the Provisional Application required by 35. U.S.C 119(e) and 37 C.F.R. 1.78(5) .
3. Applicants state that the entire delay between the date claimed for the benefit of the earlier Provisional Application was due under paragraph (a)(5)(ii) of 37 C.F.R. 1.78 and the date this claim under 37 C.F.R. 1.312 was unintentional.
4. The surcharge fee set forth in § 1.17(t), required by 37 C.F.R. 1.78(a)(6)(ii), has been paid by check on March 16, 2006.

If there are any comments, questions, objections or recommendations, the Petitions Examiner is invited to telephone at the number given below for the applicant Valeriy Bezmelnitsyn for prompt action.

Respectfully Submitted,



12/21/2006

Valeriy Bezmelnitsyn  
bezmelnitsyn@hotmail.com  
Phone: (201)-772-9873  
Fax: (434)-483- 4195



**THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicants: DUBROVSKY Roman and BEZMELNITSYN Valeriy.

Serial No. : 10/796,458

Filed: March 09, 2004

Title: Method and apparatus for carbon allotropes synthesis

Art Unit: 1754

Examiner: Alvin T. Raetzsh

**AMENDMENT AND RESPONSE**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

SIR:

1. Applicants hereby answer the decision of November 8, 2006 whereby the applicants' petition under 37 C.F.R. 1.78 was rejected under the reasoning that the petition of delay did not contain signatures of both inventors in compliance with 37 C.F.R. 1.33(b) and 1.4.
2. The applicants wish to submit for reconsideration an amended petition, statement of unintentional delay, and reply to office action originally submitted and paid in full by check on March 16, 2006, in accordance with 37 C.F.R. 1.78 to claim benefit for this application under 35 U.S.C. 119(e), of prior provisional application: Provisional Application No. 60/453,805 filed March 11, 2003.
3. The amends to the petition, statement of unintentional delay and reply to office action reflect the passing of one of the applicants, Roman Dubrovsky, on the 16 of August 2006. The petition, statement of unintentional delay and reply to office action are signed by the applicant Valeriy Bezmelnitsyn as per 409.01(f) which states that "... only the signatures of the living joint inventors are required on the papers filed with the USPTO if the legal representative of the deceased inventor does not intervene." The rightful descendant of Roman Dubrovsky is his daughter, Larisa Dubrovsky and the legal representative of Roman Dubrovsky does not wish to intervene. A copy of the death certificate and Letters Testamentary establishing Larisa Dubrovsky's eligibility to sign on behalf of Roman Dubrovsky is included for the examiners. The amended statement of unintentional delay, petition and reply to office action contain the signatures of one of the applicants Valeriy Bezmelnitsyn and the signature of Larisa Dubrovsky in place of the original applicant Roman Dubrovsky. The amended statement contains a change in the correspondence name and address.

4. Applicants state that the entire delay between the date they claim for the benefit of the earlier Provisional Application was due under paragraph (a)(5)(ii) if 37 C.F.R. 1.78 and the date this claim under 37 C.F.R. 1.312 is filed was unintentional.
5. The surcharge fee set forth in § 1.17(t), required by 37 C.F.R. 1.78 (a)(6)(ii) was paid by check on March 16, 2006.

\*\*\*\*\*

The applicants wish to extend their sincere apologies for not submitting a proper reply at an earlier date and wish to have the examiner respectfully take into account the troubles associated with the passing of one of the applicants. If there are any comments, questions, objections or recommendations, the Petitions Examiner is invited to telephone at the number given below for the applicant Valeriy Bezmelnitsyn for prompt action.

Respectfully Submitted,



12/21/2006

Valeriy Bezmelnitsyn  
1032 Dibrell Alley, Apt.#1  
Danville, VA 24541  
Phone: (201)-772-9873  
Fax: (434)-483- 4195



VALID ONLY  
WITH  
IMPRESSED  
SEAL

DATE ISSUED:  
August 18, 2006

I HEREBY CERTIFY THAT THE ATTACHED IS A TRUE COPY OF A  
RECORD ON FILE IN THE DIVISION OF VITAL RECORDS.

STATE REGISTRAR OF VITAL RECORDS

State of Maryland / Department of Health and Mental Hygiene

Certificate of Death

Reg. No.

1- For  
State  
Registrar

2. Date of Death  
14 Month Day Year  
August 16, 2006

3. Time of Death  
8:15 P M

Physician  
/ Medical  
Examiner

Funeral  
Director

Baltimore, Maryland 21215-0636

permits. Pages 1 and 2 of death certificate are to be completed with the Maryland  
Department of Health and Mental Hygiene.  
Important: Item 27 is marked other than "natural" or "harmless" if the Medical Examiner has listed any injury or other traumatic event, the Medical Examiner must be notified.

To Be Completed by Funeral Director

Medical Certifications To Be Completed by Physician/Medical Examiner

Division of Vital Records, P.O. Box 68760,

To the Hospital or Attending Physician: The law requires that death certificates be executed within 24 hours after death. Within 24 hours, the physician certifying death must sign the death certificate. If the physician is unavailable, the attending physician or the director of the funeral director may sign the death certificate. Page 2 of this document is to be completed by the physician or the director.

20

Medical Certifications To Be Completed by Physician/Medical Examiner

State  
Registrar

1. Physician / Medical Examiner		2. Date of Death		3. Time of Death	
Roman I. Dubrovsky		14 Month Day Year August 16, 2006		8:15 P M	
4a. Facility Name (If not institutional, give street and number) 10948 Whiterim Drive		4b. City, Town, or Location of Death Potomac		4c. County of Death Montgomery	
5. Social Security Number 126-64-0004		6. Sex M <input checked="" type="checkbox"/> F <input type="checkbox"/> 7. Age (In years, last birthday) 72 yrs		8. Date of Birth (Month, Day, Year) May 14, 1934	
9. Usual Residence of Decedent MD Montgomery		10a. City, Town or Location Potomac		9. Usual Residence (State or Foreign) Ukraine	
10b. Street and Number 10948 Whiterim Drive		10c. Zip Code 20854		10d. Usual City Limits Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
11. Marital Status 1 <input type="checkbox"/> Never Married 2 <input checked="" type="checkbox"/> Married 3 <input type="checkbox"/> Separated 4 <input type="checkbox"/> Divorced		12. Was Decedent Ever in U.S. Armed Forces? 1 <input type="checkbox"/> Yes 2 <input checked="" type="checkbox"/> No If Yes, Give Year of Entry:		13. Was Decedent of Hispanic Origin? (Specify Yes or No) If Yes, specify Cuban, Mexican, Puerto Rican, etc. 1 <input type="checkbox"/> Yes 2 <input checked="" type="checkbox"/> No Specify:	
14. Decedent's Education (Specify only highest grade completed) Elementary/Secondary (0-12)		15. Decedent's Usual Occupation (Give kind of work done during most of working life. DO NOT use rated) College (1-4w 5+)		16. Race - American Indian, Black, White, etc. Specify: White	
17. Father's Name (First, Middle, Last) Israel Dubrovsky		18. Mother's Name (First, Middle, Maiden Name) Yutta Frimmer		19a. Kind of Business/Industry Mechanical Engineering	
18b. Informant's Name/Relationship (Type, Print) Jarska Dubrovsky / Daughter		19b. Mailing Address (Street and Number or Rural Route Number, City or Town, State, Zip Code) 10948 Whiterim Dr. Potomac, MD 20854		19c. Location - City or Town, State Brooklyn, NY	
20a. Method of Disposition 1 <input type="checkbox"/> Burial 2 <input type="checkbox"/> Cremation 3 <input type="checkbox"/> Removal from State 4 <input type="checkbox"/> Donation 5 <input type="checkbox"/> Other (Specify)		20b. Place of Disposition (Name of cemetery, crematory or other place) Washington Cemetery		20c. Date 08/18/2006	
21. Signature of Funeral/Servicew/Transport W. Imad A. Tabbara		22. Name and Address of Facility Joseph Gowler's Sons Inc. 5130 Wisconsin Ave NW Washington, DC 20016		23. Approximate Interval Between Onset and Death	
23a. Part I. Enter the disease, or complications that caused the death. Do not enter the mode of dying, such as cardiac or respiratory arrest, shock, or brain failure. If only one cause on each line.					
Immediate Cause (Final disease or condition resulting in death)		a. Transitional Cell Carcinoma of the Bladder Due to (or as a consequence of):			
Sequentially list conditions, if any, leading to immediate cause. Enter identifying cause (Disease or injury that initiated events resulting in death) Last		b. Due to (or as a consequence of):			
		c. Due to (or as a consequence of):			
		d. Due to (or as a consequence of):			
If FEMAL: 1 <input type="checkbox"/> Yes 2 <input checked="" type="checkbox"/> No 3 <input type="checkbox"/> Unknown		23c. If yes, outcome of pregnancy 1 <input type="checkbox"/> live birth 2 <input type="checkbox"/> fetal death 3 <input type="checkbox"/> Pregnant at time of death 4 <input type="checkbox"/> Unknown		23d. Date of delivery Month Day Year	
23e. Did tobacco use contribute to the cause of death? 1 <input type="checkbox"/> Yes 2 <input checked="" type="checkbox"/> No 3 <input type="checkbox"/> Probably 4 <input type="checkbox"/> Unknown		23f. Did tobacco use contribute to the cause of death? 1 <input type="checkbox"/> Yes 2 <input checked="" type="checkbox"/> No 3 <input type="checkbox"/> Probably 4 <input type="checkbox"/> Unknown			
23g. Was an autopsy performed? 1 <input type="checkbox"/> Yes 2 <input checked="" type="checkbox"/> No		24a. Were autopsy findings available prior to completion of cause of death? 1 <input type="checkbox"/> Yes 2 <input checked="" type="checkbox"/> No			
23h. Was an autopsy performed? 1 <input type="checkbox"/> Yes 2 <input checked="" type="checkbox"/> No		24b. Were autopsy findings available prior to completion of cause of death? 1 <input type="checkbox"/> Yes 2 <input checked="" type="checkbox"/> No			
25. Was case referred to medical examiner? 1 <input type="checkbox"/> Yes 2 <input checked="" type="checkbox"/> No		26. Place of Death (Check only one) Hospital: 1 <input type="checkbox"/> Inpatient 2 <input type="checkbox"/> HHA/Inpatient 3 <input type="checkbox"/> HHA Other: 4 <input type="checkbox"/> Nursing Home 5 <input type="checkbox"/> Residence 6 <input type="checkbox"/> Other (Specify)		27. Describe how injury occurred	
27. Manner of Death 1 <input type="checkbox"/> Natural 2 <input type="checkbox"/> Accident 3 <input type="checkbox"/> Suicide 4 <input type="checkbox"/> Homicide 5 <input type="checkbox"/> Pending investigation 6 <input type="checkbox"/> Could not be determined		28a. Date of Injury (Month, Day, Year) 28b. Time of Injury M P 28c. Place of Injury - At home, farm, street, factory, office building, etc. (Specify)		28d. Location (Street and Number or Rural Route Number, City or Town, State)	
29a. Certifier (Check only one) 1 <input type="checkbox"/> Certifying Physician: To the best of my knowledge, death occurred at the time, date and place, and due to the cause(s) and manner(s) stated. 2 <input type="checkbox"/> Medical Examiner: On the basis of examination and/or investigation, in my opinion, death occurred at the time, date and place, and due to the cause(s) and manner(s) stated.		29b. Signature and title of certifier Imad A. Tabbara MD		29c. I. Census Number 18948	
30. Name and address of person who completed cause of death (Item 2a) (Type, Print) Imad A. Tabbara MD 2150 Penn Ave NW Washington, DC 20037		31. Date filled (Month, Day, Year) AUG 18 2006		32. Date signed (Month, Day, Year) 8/17/06	
33. Registrar's Signature Igor Bolshinsky					

Liber 84  
Page 633

848P2006

**LETTERS TESTAMENTARY**

**The People of the State of New York**

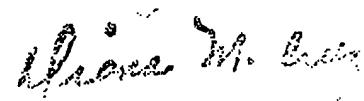
To: **LARISA DUBROVSKY**  
send greeting:

WHEREAS, the Last Will and Testament of **ROMAN DUBROVSKY** deceased, dated DECEMBER 2, 2004 was duly admitted to probate by a decree of the Surrogate's Court of Bronx County on the **28TH day of NOVEMBER, 2006** which directed the issuance to you of Letters Testamentary upon your qualifying according to law;

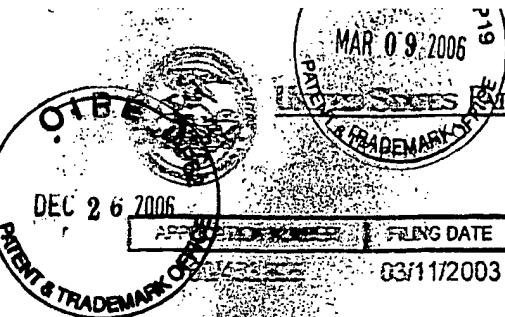
**NOW, THEREFORE, KNOW YE,** that you are hereby authorized to administer the estate of the said deceased subject to the jurisdiction and supervision of this Court.

**WITNESS, Hon. LIEB L. HOLZMAN, Surrogate**  
of the County of Bronx, this **28TH day of NOVEMBER, 2006**

**SEAL**



Chief Clerk



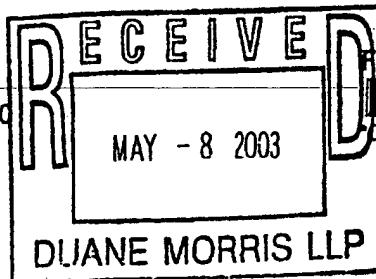
## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

DEC 26 2006

ART NO.	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY/DOCKET NO.	DRAWINGS	TOT CLAIMS	IND CLAIMS
	03/11/2003	80	NJIT-3P	7			

26530  
DUANE MORRIS LLP  
100 COLLEGE ROAD WEST, SUITE 100  
PROVIDENCE, NJ 08540-6604



CONFIRMATION NO. 5323

FILING RECEIPT

DC000000009965512\*

Date Mailed: 05/05/2003

This is acknowledged of this provisional Patent Application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data contained on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections, facsimile number 703-746-9195. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

## Applicant(s)

Roman Dubrovsky, Bronx, NY;  
Valery Nikolaevich Bezmelnytsyn, Harrison, NJ;  
Dmitry Koulikov, Jersey City, NJ;

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

"SMALL ENTITY"

## Title

Method and apparatus for carbon allotropes synthesis

LICENSE FOR FOREIGN FILING UNDER  
Title 35, United States Code, Section 184  
Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

BEST AVAILABLE COPY

Provisional and  
3/11/04 Convention Years  
A  
P.M.

R. Dubrovsky et al



10/796,458

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

**Applicant:** DUBROVSKY Roman et al.

**Serial No.:** 10/796,458

**Filed:** March 09, 2004

**Title:** Method and apparatus for carbon allotropes synthesis

**Art Unit:** 1754

**Examiner:** Alvin T. Raetzsh

AMENDMENT AND RESPONSE

Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

SIR:

This is responsive to the Office Action dated December 15, 2005 the term for response to which expires March 15, 2006.

**In the Specification** begins on page 2 of this paper.

**In the Claims** begins on page 3 of this paper.

**Remarks/Arguments** begin on page 8 of this paper.

**Election** begins on page 9 of this paper.

**Prior Art Rejection** begins on page 11 of this paper

**IN THE SPECIFICATION**

**Page 1:** After the title, please insert the following as the first paragraph:

---

This application claims the benefit of U.S. Provisional Application under 35 USC 119(e)

No 60/453,805 filed March 11, 2003.

## IN THE CLAIMS

Please amend claims 1, 4, 5; cancel claim 3; withdraw claims 7 - 17, and add new claim 18.

## LISTING OF CLAIMS

**Claim 1** (Currently Amended) A method of carbon allotropes synthesis for use in a hot plasma

zone of arc discharge plasma apparatus comprising the steps of:

selecting consumable graphite and non consumable graphite electrodes wherein at least one of said electrode having at least one longitudinal inner channel for delivering of a buffer gas outflow, feedstock material and catalyst to between electrode gap;

creating a radial buffer gas outflow in said gap between anode and cathode in the hot plasma zone;

continuous feeding to the hot plasma zone of the consumable electrode, feedstock material and catalyst admixed with the buffer gas outflow injected through the longitudinal inner channel of the electrode;

forming in the hot plasma zone a vapor from the consumable electrode and consumed materials;  
continuing an arc plasma process of carbon allotropes synthesis until anode is consumed;

removing from the hot plasma zone by the radial buffer gas outflow the produced vapor for quenching and condensing;

and forming and collecting of carbon allotropes contained soot.

**Claim 2** (Original) The method as defined in claim 1, wherein the said continuous feeding of selected electrode, feedstock material and catalyst into the hot plasma zone is performed by

moving of at least one consumable electrode towards the said hot plasma zone.

**Claim 3 (Cancelled)**

**Claim 4 (Currently Amended)** A method as defined in claim 1, wherein said buffer gas is an inert gas selected from the group consisting of helium only, mixture of helium with up to 20% of argon, and mixture of helium with up to 10% of nitrogen.

**Claim 5 (Currently Amended)** The method as defined in claim 1, wherein said vapor [[being]] is removed from the hot plasma zone to a volume of a reaction vessel by force of the buffer gas outflow [[for]] to increase [[ing]] productivity, and yield and completely eliminating deposits on the cathode [[deposit]].

**Claim 6 (Original)**. The method as defined in claim 1, wherein a produced carbon soot contains at least one molecule of fullerene and/or at least one carbon nanotube.

**Claim 7. (Withdrawn)** A DC arc discharge plasma apparatus for fullerenes and nanotubes synthesis comprising: a water-cooled reaction vessel, an electrode system sealed in said reaction vessel, wherein said electrode system having anode and cathode with at least one longitudinal inner channels therein for creating buffer gas outflow, feeding feedstock and catalyst through said longitudinal inner channels to a hot plasma zone and also for removing of produced vapor from the hot plasma zone by said buffer gas outflow.

**Claim 8. (Withdrawn)** The DC arc discharge plasma apparatus for fullerenes and nanotubes synthesis according to claim 7 further comprising: a device for alternative temporarily changing polarity of electrodes during operation for removing cathode deposit.

**Claim 9. (Withdrawn)** The DC arc discharge plasma apparatus for fullerenes and nanotubes synthesis, according to claim 7, further comprising a filtration and gas re-circulation means to separate carbon soot from inert gas.

**Claim 10. (Withdrawn)** The DC arc discharge plasma apparatus according to claim 7, wherein said anode and cathode have different cross sectional areas comprising differently assembled blocks, said blocks shape consisting of rods, bars and rods and bars, where said rods, bars and rods and bars are assembled in tight contact along longitudinal sides to form inner longitudinal channel.

**Claim 11. (Withdrawn)** The DC arc discharge plasma apparatus according to claim 7, wherein said cathode comprising distal end with outlet holes, said distal end with outlet holes being connected with said longitudinal inner channel to uniformly distribute buffer gas outflow in the hot plasma zone.

**Claim 12. (Withdrawn)** The cathode of the said electrode system according to claim 7, wherein said cathode comprising an additional peripheral annular gas channel to block a side carbon deposit on a cathode surface.

**Claim 13. (Withdrawn)** The apparatus according to claim 11, wherein said outlet holes in order to improve gas dynamic of the gas outflow injected into the hot plasma zone have a specially shaped chamfered, fillet or cylindrically straight hole ends.

**Claim 14. (Withdrawn)** The apparatus as defined in claim 10, wherein said block assembled anode has inserts of metallic catalytic wires or strips.

**Claim 15. (Withdrawn)** The DC arc discharge plasma apparatus for fullerenes and nanotubes

synthesis according to claim 7 wherein said electrode system in order to achieve maximum productivity and optimal yield should allow to maintain a ratio by mass between buffer gas outflow rate and anode evaporation rate within 1 to 10.

**Claim 16. (Withdrawn)** A DC arc discharge plasma apparatus for fullerenes and nanotubes synthesis comprising: a water cooled reaction vessel; an electrode system sealed in said reaction vessel; wherein said electrode system having anode and cathode with at least one longitudinal inner channels therein for creating buffer gas outflow, feeding feedstock and catalyst through said longitudinal inner channels to a hot plasma zone and also for removing of produced vapor from the hot plasma zone, wherein said cathode comprising an additional peripheral annular gas channel to block a side carbon deposit on a cathode surface and wherein said cathode comprising distal end with outlet holes, said distal end with outlet holes being connected with said longitudinal inner channel to uniformly distribute buffer gas outflow in the hot plasma zone; a feeding system to provide continuous consumption of anode and inflow of feedstock and catalyst admixed with buffer gas outflow; a device for alternative change of electrodes polarity; a filtration and gas re-circulation means to separate carbon soot from inert gas; and a device for inclination of reaction vessel with respect to vertical position;

**Claim 17. (Withdrawn)** The DC arc discharge plasma apparatus according to claim 16, wherein said reaction vessel being mounted pivotably on a stationary support for said reaction vessel inclination around horizontal axis up to 120 degree with respect to vertical position.

**Claim 18. (New)** The method as defined in claim 1, wherein said method in order to achieve maximum productivity and optimal yield maintains a ratio by mass within 1 to 10 between injected buffer gas outflow rate and anode evaporation rate.

---

**REMARKS/ARGUMENTS**

Reconsideration of the present application, as amended, is respectfully requested.

The December 15, 2005 Office Action and the Examiner's comments have been carefully

considered. In response, the claims 1, 4 and 5 are amended, claim 3 is cancelled, new claim 18 was added (all features of new claim 18 was presented previously in claim 15) and remarks are set forth below in a sincere effort to place the present application in form for allowance. The amendments are supported by the application as originally filed. Therefore, no new matter is added.

The Applicant will respond on the Examiner's numbered remarks posted in the Detailed Action by assigning consequent number to so called "Point #".

**Point 10.** There is erroneously mentioned by the Examiner reference when claim 6 called claim 5.

Applicants believe that the following remarks address and overcome all of the Examiner's objections and rejections.

## ELECTION

Applicants hereby elect Claims 1-6 and new claim 18 for further prosecution on the merits.

**Point 2.** Inventors disagree with the Examiner's position that (1) "process as claimed can be practiced by another materially different apparatus or by hand", or (2) "apparatus as claimed can be used to practice another and materially different process". Although the Examiner asserts: "In this case the apparatus could be used to carry out hydrogenation reaction".

In our opinion process, as claimed, can be efficiently practiced only by claimed method having the claimed features of designed electrode system in the proposed apparatus claims. We cannot understand the Examiner suggestion that process as claimed can be practiced by hand. The proposed method is carrying out in automatically controlled plasma reactor having power, vacuum, gas, water supply systems and strong proportionality between injected outflow rate and consumable electrode evaporation rate.

Another Examiner's assertion is questionable because the invented apparatus can only process a solid precursors where injected gaseous materials are used for technological purpose only.

**Point 5.** The inventorship is not amended of the remaining in the application claims.

**Point 7, 8, 9.** Claims 4 and 5 have been amended to better comply with the requirements of 35 USC 112 and to more clearly recite the distinguishing features of the present invention. The informalities pointed out by the Examiner have all been corrected. Proper antecedent basis has been provided for all claimed elements, and all claimed elements and the structural relationships

therebetween have been more positively and more clearly recited. It is respectfully submitted that no new matter has been added and amended claims 1, 4 and 5 are in full compliance with all of the requirements of 35 USC 112. Accordingly, it is respectfully requested that the amendments to the claims be approved and entered and that the rejection under 35 USC 112, second paragraph, be withdrawn.

---

**PRIOR ART REJECTIONS****Rejection under 35 USC 103**

**Point 12.** Claims 1, 2, and 4-6 were rejected under 35 USC 103(a) as being unpatentable over Zettl et al. (U.S. Pat. No. 6,063,243)

The Examiner's rejection is respectfully traversed on the grounds that Zettl et al do not disclose, teach or suggest all of the features of amended independent claims 1,

In the Office Action, claim 3 is rejected under 35 U.s.c. 103(a) as being unpatentable over Zettl et.al. (6,063,243) and further in view of Bolkskar et.al.(US PGPub 2003/0220518 A1).

Claims of the present invention are different and are patentable:

In amended claim 1 of the present invention the features are:

"selecting consumable graphite and non consumable graphite electrodes wherein at least one of said electrode having at least one longitudinal inner channel for delivering of a buffer gas outflow, feedstock material and catalyst to between electrode gap; creating a radial buffer gas outflow in said gap between anode and cathode in the hot plasma zone;

continuous feeding to the hot plasma zone of the consumable electrode, feedstock material and catalyst admixed with the buffer gas outflow injected through the longitudinal inner channel of the electrode;

forming in the hot plasma zone a vapor from the consumable electrode and consumed materials;

continuing an arc plasma process of carbon allotropes synthesis until anode is consumed”

Said at least one longitudinal inner channel or network of inner channels as shown in Fig.2, 3, 4, 5 and 6 are used for delivering of inert buffer gas outflow to the between electrode gap.

Zettl et.al. (claim 1) claims “providing first and second electrode in the chamber wherein at least one of the electrode has an interior region comprising one or more conduits ,wherein each conduit connect a fluid sources located outside the chamber to a coolant core inside the electrode”.

We are considering that present invention teach different purpose.

In our invention, as we are teaching in claim 2, “said continuous feeding of selected electrode, feedstock material and catalyst into the hot plasma zone is performed by moving of at least one consumable electrode towards the said hot plasma zone” and “continuous feeding of selected materials with admixed inert buffer gas comprising helium, mixture of helium with 20% of argon and/or mixture of helium with 10% of nitrogen” (Claim 1, page 9, lines 15-18).

Zettl et.al. (claim 1C ) teaches “moving material through a conduit in the first electrode” to the gap and then (claim 3) through a conduit in the second electrode to a region outside the vacuum chamber”.

Zettl et.al.claim described on lines 58-67 and addressed by the Examiner teaches moving material such as metals Co, Ni, Yt, gases He and N but Ar through the conduit in the first electrode to the gap and then (claim 3) through the second electrode to a region outside the vacuum chamber.

As the Examiner mentioned, "claim 2 of Zettl's invention does not teach moving the consumable electrode towards the plasma zone, "it would have been obvious to someone of ordinary skill in the art to do so in order to keep a preferable distance in the between electrode gap".

Zettl's invention does not require this motion because they do not have consumed electrode. They need only one time adjustment in the beginning of operational cycle because later on they are moving all material through the conduit.

In contrary in our invention we are using graphite electrodes and they are consumable as the precursor for producing desired product such as fullerenes and carbon nano tubes.

As the Examiner mentioned, "claims 1&5 of Zettl's invention do not explicitly teach a radial gas outflow. The structure of the Zettl's apparatus at arc zone, however, appears to be the same as applicant's, and a similar flow pattern would be expected".

At the same time, objected by the Examiner "radial buffer gas flow" mentioned as entirely not clear term. Inventors disagree with the Examiner opinion

In response, as it is shown on Fig.2, 3, 4, 5, 6 &7, claim 1, and on page 7, lines 13-15 of the specification the invention comprises both consumable and not consumable graphite electrode having at least one longitudinal inner channel for injection of buffer gas into hot plasma zone and creating a radial buffer gas outflow at the exit from cathode in the hot plasma zone (as shown on

Fig. 1). The used electrodes, regarding of the used diameters up to 38 mm (see examples), have flat faces positioned in hot plasma zone and depending on productivity automatically are maintaining between electrodes gap in the range of 1,5-5 mm (see example 1) during the process.

In operational stage the next scenario takes place: gas come out from the cathode channel in plasma zone, it hits the flat face of the second electrode, repulses, turn out and travel in radial direction out of the plasma zone (see Fig 1, 3,4 & 5) creating so called radial buffer gas outflow phenomenon. The central longitudinal channel could be branched out at the distal end of electrode with multiple outlet holes of smaller diameter shown on Fig.3, 4 and 5 for better, uniform distribution of buffer gas. Created radial buffer gas outflow is used for forced evacuation of developed carbon vapor from the hot plasma zone to reaction vessel. Radial buffer gas outflow is created by the network of inner channels in the not consumable electrode-cathode but could be created as well in anode body. Subfigures 1a, 1b and 1c depict three possible ways of creating the radial buffer gas outflow in the gap between anode and cathode in plasma zone. Released buffer gas into hot plasma zone from the network of inner channels allows producing of quick uniform mixture with developed carbon vapor in this zone and quick forced evacuation outward to reaction vessel.

The Zettl's method could not benefit from using radial buffer gas outflow because this method comprises injection of material through first electrode to arc zone and then immediate exhaust of the produced product through the second electrode out of reaction vessel.

Zettl's et al. do not disclose, teach or suggest this unique features as " creating a radial buffer gas outflow in the gap between anode and cathode in the plasma zone and continuing an arc plasma process of carbon allotropes synthesis until anode is consumed" as teach amended claim 1 of the present invention. This feature is supported by original specification (see page 4, paragraph 0045).

The inventors may mention next in response to the last remark of the Examiner in his point 12 note. The main precursor for production of fullerenes and carbon nano tubes is solid graphite-the main body of consumable electrodes. The injected buffer gas is used for developing the efficient mixture of produced carbon vapor in the hot plasma zone, as a main mission, for forced quick evacuation of carbon vapor from the plasma zone outward to reaction vessel for quenching. As the examiner correctly stated the injected buffer gas outflow could be used for feeding other gaseous or powders materials as a second mission.

In view of the arguments presented above, it is respectfully submitted that claims 1-6 patentably distinguish over Zettl' et al, under 35 USC 102 as well as under 35 USC 103. But we recognize the Examiner reference of Bol'skar et.al. (US PGPub 2003/0220518 A1), agree with the Examiner position and are canceling this claim 3.

**Point 14.** Claims 1, 2 and 4-6 were rejected under 35 USC 102 as being anticipated by US PGPub2005/0019245 A1 ("Koulikov"). This rejection, however, is respectfully traversed with respect to the PETITION TO CLAIM BENEFIT UNDER 35 U.S.C. 119(e) OF PRIOR

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**1.78(a)(6)).**

We claimed priority only in the Declaration when Utility application was filed.

It was our mistake.

• \* \* \* \* \*

## **SUMMARY**

Having fully addressed the Examiner's rejection of all of the claims Applicant submit that the reasons for the Examiner's rejections have been overcome. Applicant respectfully requests that the amendments be entered and Notice of Allowance be issued.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

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